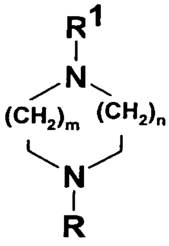
Claims:

1. A compound represented by the general formula



(I)

any of its enantiomers or any mixture thereof, isotopes thereof or a pharmaceutically acceptable salt thereof;

wherein

n is 1, 2 or 3;

m is 0,1 or 2;

R represents hydrogen, alkyl, cycloalkyl, cycloalkylalkyl, or aralkyl; and

R^1 represents **aminophenyl; nitrophenyl; hydroxyphenyl, alkoxyphenyl;**
a monocyclic 5 to 6 membered heterocyclic group which may be substituted one or more times with substituents selected from the group consisting of alkyl, cycloalkyl, cycloalkylalkyl, alkenyl, alkynyl, alkoxy, cycloalkoxy, alkenoxy, alkynoxy, alkynoxy, methylenedioxy, halogen, CF_3, OCF_3, CN, amino, nitro, $-COOR^3$, $-CONR^2R^3$, $-NH-CO_2R^2$, $NHCO-R^2$, $-OCO-NR^2R^3$; wherein R^2 and R^3 independently represents hydrogen or alkyl;

aryl optionally substituted one or more times with alkyl, cycloalkyl, cycloalkylalkyl alkenyl, alkynyl, alkoxy, cycloalkoxy, alkenoxy, alkynoxy, methylenedioxy, halogen, CF_3, OCF_3, CN, amino and nitro;

-X-alkyl-Y-alkyl wherein X and Y independently represents O, S, NH, N-alkyl or Se; and alkyl is optionally substituted with alkoxy or thioalkoxy;

$-X-(alkyl)_o-aryl$ wherein o is 0 or 1 and X represents O, S, NH, N-alkyl or Se; optionally substituted one or more times with alkyl, cycloalkyl, cycloalkylalkyl alkenyl, alkynyl, alkoxy, cycloalkoxy, alkenoxy, alkynoxy, methylenedioxy, halogen, CF_3, OCF_3, CN, amino and nitro;

-X-(alkyl)$_o$-Z wherein o is 0 or 1 and X represents O, S, NH, N-alkyl or Se and Z represents a 5- or 6- membered monocyclic heterocyclic group; optionally substituted one or more times with alkyl, cycloalkyl, cycloalkylalkyl alkenyl, alkynyl, alkoxy, cycloalkoxy, alkenoxy, alkynoxy, methylenedioxy, halogen, CF_3, OCF_3, CN, amino and nitro;

- a monocyclic 5 to 6 membered heterocyclic group optionally substituted one or more times with alkyl, cycloalkyl, cycloalkylalkyl, alkenyl, alkynyl, alkoxy, cycloalkoxy, alkenoxy, alkynoxy, methylenedioxy, halogen, CF_3, OCF_3, CN, amino and nitro;

or R^1 represents **a bicyclic heterocyclic group,** composed of a 5 to 6 membered monocyclic heterocyclic group fused to a benzene ring, and which may be substituted one or more times with substituents selected from the group consisting of alkyl, cycloalkyl, cycloalkylalkyl alkenyl, alkynyl, alkoxy, alkoxy-alkoxy, cycloalkoxy, alkenoxy, alkynoxy, methylenedioxy, halogen, CF_3, OCF_3, CN, amino, nitro, aryl optionally substituted one or more times with alkyl, cycloalkyl, cycloalkylalkyl alkenyl, alkynyl, alkoxy, cycloalkoxy, alkenoxy, alkynoxy, methylenedioxy, halogen, CF_3, OCF_3, CN, amino and nitro; and a monocyclic 5 to 6 membered heterocyclic group optionally substituted one or more times with alkyl, cycloalkyl, cycloalkylalkyl alkenyl, alkynyl, alkoxy, cycloalkoxy, alkenoxy, alkynoxy, methylenedioxy, halogen, CF_3, OCF_3, CN, amino and nitro;

with the proviso that when R^1 is hydroxyphenyl, alkoxyphenyl, nitrophenyl or aminophenyl, then m and n are not both 2;

2. A compound of formula (I), according to claim 1, wherein R and R^1 is attached to a piperazine, a homopiperazine, a 1,4-di-azacyclooctane, a 1,5-di-azacyclooctane, a 1,3 diazacyclohexane or an imidazolidine;

3. A compound of formula (I), according to claim 1, wherein R^1 represents **isoquinolinyl;** or

phenyl optionally substituted with nitro, hydroxy, amino or alkoxy; or

pyridyl, quinolinyl, pyridazinyl or pyridinyl all of which may be optionally substituted one or more times with alkoxy, cycloalkoxy, alkoxyalkoxy, alkoxycycloalkyl, hydroxyalkoxy, thioalkoxy, thioalkylaryl, alkenoxy, alkynoxy, carboxylamido, a bicyclic heterocyclic group, thioalkoxyaryl, thioaryl, hydroxy or trifluoromethanesulfonyloxy; halogen, phenyl optionally substituted with nitro; a monocyclic 5 to 6 membered heterocyclic group optionally substituted with alkyl;

4. A compound of formula (I), according to claim 1, wherein R^1 represents 3-pyridyl, 3-quinolinyl, 5-methoxy-3-pyridyl, 5-chloro-3-pyridyl, 5-(4-methyl-1-piperazinyl)-3-pyridyl, 5-ethoxy-3-pyridyl, 6-methoxy-3-pyridyl, 5-propyloxy-3-pyridinyl, 5-phenyl-3-pyridyl, 5-(2-methyl-propyloxy)-3-pyridyl, 5-propyl-1-en-oxy-3-pyridyl, 2-chloro-5-methoxy-3-pyridyl, 6-chloro-5-methoxy-3-pyridyl, 6-bromo-5-ethoxy-3-pyridyl, 6-(N-pyrrolidinyl)-3-pyridyl, 6-phenyl-3-pyridyl, 5-(3-nitrophenyl)-3-pyridyl, 5-butoxy-3-pyridyl, 5-methoxyethoxy-3-pyridyl, 5-(2-methyl-propoxy)-3-pyridyl, 5-(2-hydroxy-ethoxy)-3-pyridyl, 5-(3-methyl-butoxy)-3-pyridyl, 5-cyclopropylmethoxy-3-pyridyl, 5-propyloxy-3-pyridyl, 5-hexyloxy-3-pyridyl, 5-cyclohexylmethoxy-3-pyridyl, 6-thioethoxy-3-pyridyl, 5-(2-ethoxy-ethoxy)-3-pyridyl, 5-pentyloxy-3-pyridyl, 5-heptyloxy-3-pyridyl, 5-(propyl-1-en-oxy)-3-pyridyl, 5-thiobenzyl-3-pyridyl, 5-carboxylamido-3-pyridyl, 5-thiophenyl-3-pyridyl, 5-methoxy-methoxy)-3-pyridyl, 5-(3-pyridyl)-3-pyridyl, 5-(1-pyrrolyl)-3-pyridyl, 5-(1-indolyl)-3-pyridyl, 5.6-dimethoxy-3-pyridyl, 5-ethenyloxy-3-pyridyl, 5-cyclopentyloxy-3-pyridyl, 5-(ethoxy-d5)-3-pyridyl, 3-chloro-5-pyridyl, 3-bromo-5-pyridyl, 4- isoquinolinyl, 5-hydroxy-3-pyridyl, 5-trifluoromethanesulfonyl-oxy-3-pyridyl, 5-ethynyl-3-pyridyl, 3-nitrophenyl, 3-aminophenyl, 3-methoxyphenyl, 3-hydroxyphenyl, 6-chloro-3-pyridazinyl, 6-phenyl-3-pyridazinyl, 6-chloro-2-pyrazinyl, 3,6-dimethyl-2-pyrazinyl, 6-methyl-3-pyridazinyl, 5-triflouromethyl-3-pyridyl, 6-bromo-3-pyridyl, 6-chloro-3-pyridyl or 3-pyridazinyl;

5. A compound of formula (I), according to claim 1, wherein R represents hydrogen, lower alkyl or aralkyl;

6. A compound of formula (I), according to claim 1, said compound being:

4-Methyl-1-(3-pyridyl)-piperazine;
4-Methyl-1-(3-pyridyl)-piperazine;
4-Methyl-1-(5-methoxy-3-pyridyl)-piperazine;
3,5-Bis-[4,4´-methyl-1,1´-piperazinyl]pyridine;
1-(5-Chloro-3-pyridyl)-4-Methyl-piperazine;
4-Methyl-1-(5-phenyl-3-pyridyl)-piperazine;
1-(5-Ethoxy-3-pyridyl)-4-methyl-piperazine;
1-(5-Butoxy-3-pyridyl)-4-methyl-piperazine;
4-Methyl-1-[5-(propyl-1-en-oxy)-3-pyridyl]-piperazine;
1-(5-Ethenyloxy-3-pyridyl)-4-methyl-piperazine;
1-(5-Methoxy-3-pyridyl)-4-methyl-1,5-diazacyclooctane;
1-(6-Chloro-3-pyridazinyl)-4-methyl-1,5-diazacyclooctane;
1-(3-Pyridyl)-piperazine;

1-(3-Pyridyl)-piperazine;
1-(5-Methoxy-3-pyridyl)-piperazine;
1-(5-Chloro-3-pyridyl)-piperazine;
1-(5-Phenyl-3-pyridyl)-piperazine;
1-(5-Methoxy-3-pyridyl)-1,5-diazacyclooctane;
1-(6-Chloro-3-pyridazinyl)-1,5-diazacyclooctane;
1-(6-Chloro-3-pyridazinyl)-1,4-diazacyclooctane;
1-(5-Ethoxy-3-pyridyl)piperazine;
1-(5-Butoxy-3-pyridyl)piperazine;
1-[5-(Propyl-1-en-oxy)-3-pyridyl]-piperazine;
1-(5-Ethenyloxy-3-pyridyl)piperazine;
1-(5-Ethoxy-3-pyridyl)-1,5-diazacyclooctane,
1-(5-Propyloxy-3-pyridinyl)-1,5-diazacyclooctane,
1-[5-(Propyl-1-en-oxy)-3-pyridyl]-1,5-diazacyclooctane,
1-(5-Ethenyloxy-3-pyridyl) 1,5-diazacyclooctane;
1-(5-Ethoxy-3-pyridyl)-4-ethyl-piperazine;
4-Methyl-1-(3-pyridyl)-homopiperazine;
4-Methyl-1-(3-pyridyl)-homopiperazine;
1-(5-Methoxy-3-pyridyl)-4-methyl-homopiperazine;
1-(5-Ethoxy-3-pyridyl)-4-methyl-homopiperazine;
4-Methyl-1-(5-phenyl-3-pyridyl)-homopiperazine;
1-(5-Butoxy-3-pyridyl)-4-methyl-homopiperazine;
1-(5-Methoxyethoxy-3-pyridyl)-4-methyl-homopiperazine;
4-Methyl-1-[5-(2-methyl-propyloxy)-3-pyridyl]-homopiperazine;
1-(5-Cyclopropylmethoxy-3-pyridyl)-4-methyl-homopiperazine;
4-Methyl-1-(5-propyloxy-3-pyridyl)-homopiperazine;
1-(5-Hexyloxy-3-pyridyl)-4-methyl-homopiperazine;
4-Methyl-1-[5-(3-methyl-butoxy)-3-pyridyl]-homopiperazine;
4-Methyl-1-(6-thioethoxy-3-pyridyl)-homopiperazine;
1-(5-Cyclohexylmethoxy-3-pyridyl)-4-methyl-homopiperazine;
4-Methyl-1-(5-pentyloxy-3-pyridyl)-homopiperazine;
1-(5-Heptyloxy-3-pyridyl)-4-methyl-homopiperazine;
4-Methyl-1-(5-propyl-1-en-oxy-3-pyridyl)-homopiperazine;
4-Methyl-1-(5-thiobenzyl-3-pyridyl)-homopiperazine;
4-Methyl-1-[5-(3-pyridyl)-3-pyridyl]-homopiperazine;
4-Methyl-1-(3-nitrophenyl)-homopiperazine;

4-Methyl-1-(6-chloro-3-pyridazinyl)-homopiperazine;
4-Methyl-1-(6-phenyl-3-pyridazinyl)-homopiperazine;
4-Methyl-1-(3-pyridazinyl)-homopiperazine;
4-Methyl-1-(6-methyl-3-pyridazinyl)-homopiperazine;
1-(5-Cyclopentyloxy-3-pyridyl)-4-methyl-homopiperazine;
4-Benzyl-1-(3-pyridyl)-homopiperazine;
4-Ethyl-1-(3-pyridyl)-homopiperazine;
1-(3-Pyridyl)-homopiperazine;
1-(3-Pyridyl)-homopiperazine;
1-(6-Methoxy-3-pyridyl)-homopiperazine;
1-(2-Chloro-5-methoxy-3-pyridyl)-homopiperazine;
1-(6-Chloro-5-methoxy-3-pyridyl)-homopiperazine;
1-(6-Bromo-5-ethoxy-3-pyridyl)-homopiperazine;
1-[6-(N-Pyrrolidinyl)-3-pyridyl]-homopiperazine;
1-(6-Phenyl-3-pyridyl)-4-homopiperazine;
1-[5-(3-Nitrophenyl)-3-pyridyl]-4-homopiperazine;
1-(5-Methoxy-3-pyridyl)-homopiperazine;
1-(5-Phenyl-3-pyridyl)-homopiperazine;
1-(5-Ethoxy-3-pyridyl)-homopiperazine;
1-(5-Butoxy-3-pyridyl)-homopiperazine;
1-(5-Methoxyethoxy-3-pyridyl)-homopiperazine;
1-[5-(2-Methyl-propoxy)-3-pyridyl]-homopiperazine;
1-[5-(2-Hydroxy-ethoxy)-3-pyridyl]-homopiperazine;
1-[5-(3-Methyl-butoxy)-3-pyridyl]-homopiperazine;
1-(5-Cyclopropylmethoxy-3-pyridyl)-homopiperazine;
1-(5-Propyloxy-3-pyridyl)-homopiperazine;
1-(5-Hexyloxy-3-pyridyl)-homopiperazine;
1-(5-Cyclohexylmethoxy-3-pyridyl)-homopiperazine;
1-(6-Thioethoxy-3-pyridyl)-homopiperazine;
1-[5-(2-Ethoxy-ethoxy)-3-pyridyl]-homopiperazine;
1-(5-Pentyloxy-3-pyridyl)-homopiperazine;
1-(5-Heptyloxy-3-pyridyl)-homopiperazine;
1-[5-(Propyl-1-en-oxy)-3-pyridyl]-homopiperazine;
1-(5-Thiobenzyl-3-pyridyl)-homopiperazine;
1-(5-Carboxylamido-3-pyridyl)-homopiperazine;
1-(5-Thiophenyl-3-pyridyl)-homopiperazine;

1-[(5-Methoxy-methoxy)-3-pyridyl]-homopiperazine;
1-[5-(3-Pyridyl)-3-pyridyl]-homopiperazine;
1-(5-(1-Pyrrolyl)-3-pyridyl)-homopiperazine;
1-(5-(1-Indolyl)-3-pyridyl)-homopiperazine;
1-(5.6-Dimethoxy-3-pyridyl)-homopiperazine;
1-(5-Ethenyloxy-3-pyridyl)homopiperazine;
1-(5-Cyclopentyloxy-3-pyridyl)homopiperazine;
1-[5-(Ethoxy-d5)-3-pyridyl]-homopiperazine;
1-(3-Chloro-5-pyridyl)homopiperazine;
1-(3-Bromo-5-pyridyl)homopiperazine;
1-(4- Isoquinolinyl)-homopiperazine;
1-(5-Hydroxy-3-pyridyl)-homopiperazine;
1-(5-Trifluoromethanesulfonyl-oxy-3-pyridyl)-homopiperazine;
1-(5-Ethynyl-3-pyridyl)-homopiperazine;
1-(3-Nitrophenyl)-homopiperazine;
1-(3-Aminophenyl)-homopiperazine;
1-(3-Methoxyphenyl)-homopiperazine;
1-(3-Hydroxyphenyl)-homopiperazine;
1-(6-Chloro-3-pyridazinyl)-homopiperazine;
1-(6-Phenyl-3-pyridazinyl)-homopiperazine;
1-(6-Chloro-2-pyrazinyl)-homopiperazine;
1-(3,6-Dimethyl-2-pyrazinyl)-homopiperazine;
1-(6-Methyl-3-pyridazinyl)-homopiperazine;
1-(5-Triflouromethyl-3-pyridyl)-homopiperazine;
1-(6-Bromo-3-pyridyl)-homopiperazine;
1-(6-Chloro-3-pyridyl)-homopiperazine;
1-(3-Pyridazinyl)-homopiperazine;
N-(5-Methoxy-3-pyridyl)-ethylenediamine;
1-(5-Methoxy-3-pyridyl)-imidazolidine;
1-(5-Methoxy-3-pyridyl)-1.3-diazacyclohexane;
or a pharmaceutically acceptable addition salt thereof;

7. A pharmaceutical composition, comprising a therapeutically effective amount of a compound of claim 1, or a pharmaceutically acceptable addition salt thereof, together with at least one pharmaceutically acceptable carrier or diluent.

8. A compound of claim 1, for use as a medicament for treatment of a disease of a living animal body, including a human, which disease is responsive to the activity of nicotinic Ach receptors modulators.

9. The use of a compound according to claim 1 for the manufacture of a medicament for the treatment of a disease of a living animal body, including a human, which disease is responsive to the activity of nicotinic ACh receptor modulators.

10. The use according to claim 9 wherein the disease to be treated is pain, a disease in the central or peripheral system, a disease caused by smooth muscle contraction, neurodegeneration, inflammation, chemical substance abuse or withdrawal symptoms caused by the cessation of intake of the chemical substance, such as assistance in the cessation of smoking.

11. The use of a compound according to claim 9 wherein a disease in the central or peripheral system is Alzheimer's disease, Parkinson's disease, memory dysfunction or attention deficit hyperactivity disorder.

12. A method of treating a disease of a living animal body, including a human, which disease is responsive to the activity of nicotinic ACh receptor modulators, comprising the step of administering to such a living animal body, including a human, in need thereof a therapeutically effective amount of a compound according to claim 1.

13. A method according to claim 12, wherein pain, a disease in the central or peripheral system, a disease caused by smooth muscle contraction, neurodegeneration, inflammation, chemical substance abuse or withdrawal symptoms caused by the cessation of intake of chemical substances, such as smoking cessation, is treated by administering to a mammal in need thereof a therapeutically effective amount of a compound of claim 1.

14. The method according to claim 12 wherein a disease in the central or peripheral system, said disease being Alzheimer's disease, Parkinson's disease, memory dysfunction or attention deficit hyperactivity disorder, is treated by administering to a mammal in need thereof a therapeutically effective amount a compound of claim 1.